



**VIRGINIA DEPARTMENT OF HOUSING
AND COMMUNITY DEVELOPMENT**

Partners for Better Communities¹

2024 Code Development Cycle

General Information



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2024 Code Development Cycle (tentative dates)



April 1st: cdpVA opened for submission of code change proposals

June: Notices of Intended Regulatory Action (NOIRAs) published

June - July: Study Groups and Sub-Workgroups begin meeting

July 14th: BHCD Public Hearing (with VFSB for SFPC)

October 8th: Deadline for submission of proposals for the 2024 CDC

July – November 2025: Stakeholder Workgroup meetings on proposals

March 2026: BHCD meets to consider proposals

September 2026: BHCD meets to consider proposed regulations

March 2027: BHCD meets to consider final regulations

October 2027: 2024 Virginia Codes Effective

codes.iccsafe.org/codes/Virginia

**Free Online Access to
Virginia and ICC Code books**



va.cdpassess.com Virginia's online code development System

Virginia DHCD



Virginia's Online Code Development Process

The cdpVA® system is Virginia's new online Code Development Process. cdpVA® allows you to create code change proposals, submit public comments and access any information about the Virginia Code Change Process. Virginia is a leader in building and fire code regulations, and stakeholder input is vital to Virginia's code development process. We encourage participation in this process through cdpVA®, and ask that you invite colleagues and peers with an interest in the Virginia Code Change Process to participate.

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HOW IT WORKS

Meeting Information

Information regarding workgroup meetings, including date, time, location and agendas, will be available through cdpVA®.

All information is listed under each workgroup, so be sure to follow the workgroups that you are most interested in, and plan to attend meetings throughout the Code Change Process.

Online Code Access

In cdpVA®, you will be able to access both the current Virginia Building Codes, as well as the International Codes.

Having both sets of online codes offers the ability to create a proposal by modifying existing state amendments to the International Codes or to change the text of the International Codes.

Need Assistance?

For information about the Virginia Code Change Process, contact:
Virginia Department of Housing and Community Development (DHCD)
(804) 371-7150
sbco@dhcd.virginia.gov

Tutorial videos and how-to guides about cdpVA® are available online. For issues with cdpVA®, contact: cdpassess@iccsafe.org

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LINKS

[Code Development Process Flowchart](#)

[2024 Code Development Cycle Documents](#)

[2021 Code Development Cycle Documents](#)

<https://www.dhcd.virginia.gov/2024-code-development-cycle>

- Workgroup documents (agendas, meeting summaries, etc.)
- Sub-workgroup documents (agendas, meeting summaries, etc.)
- Study Group documents (agendas, meeting summaries, etc.)
- General Information (memos, schedules, process flow chart, etc.)
- 2024 Base Documents

<https://www.dhcd.virginia.gov/2024-code-development-cycle>

WORKGROUP DOCUMENTS	SINGLE EXIT STAIR STUDY GROUP
EXPEDITING PERMITS AND COS STUDY GROUP	HEATING & COOLING STUDY GROUP June 23, 2025 Heating and Cooling Study Group Meeting: Agenda Summary Documents
SFPC SUB-WORKGROUP	ENERGY SUB-WORKGROUP
MEMOS NOIRA Stakeholder Memo Code Development Cycle Stakeholder Memo - April 1, 2025 Code Development Cycle Stakeholder Memo - June 10, 2025	BASE DOCUMENTS 2024 IBSR Base Document 2024 SFPC Base Document 2024 VEBC Base Document 2024 VPMC Base Document 2024 VCC Base Document
GENERAL INFORMATION	

What are they and what is their purpose?

- Documents compiled by staff at the beginning of each Virginia code development cycle for each of the following regulations: SFPC, USBC, and IBSR
- Not intended to create substantive changes to the existing regulations
- Could be viewed as broad code change proposals
- Intended to serve as the basis for the publishing of proposed regulations
- Must be approved by the BHCD
- Correlated by DHCD staff with individual code change proposals approved by the BHCD
 - Individual code change proposals approved by the BHCD take precedence over conflicting provisions of the Base Documents
 - The approved Base Documents + approved individual code change proposals = proposed regulations



2024 USBC Base Document (BD)



- The purpose of the 2024 USBC is to convert the 2021 USBC to the 2024 USBC by comparing the language in the 2021 USBC to the 2024 editions of the International Codes and standards which have amendments in the USBC
- Makes those necessary changes to the 2021 USBC to bring in the 2024 International Codes and standards and keep the existing state amendments which were made to the 2021 International Codes and standards
- Differences between the 2021 International Codes and standards and the 2024 International Codes and standards which are not affected by existing state amendments to the 2021 International Codes and standards are not addressed in these documents

Base Documents cont. – Examples of Changes



- Section 101.1: revised with correct model code edition/year.

Note 1: The IBC references other International Codes and standards, including the following major codes:

~~2021~~ 2024 International Plumbing Code (IPC)

~~2021~~ 2024 International Mechanical Code (IMC)

~~2020~~ 2023 National Fire Protection Association (NFPA) 70

~~2021~~ 2024 International Fuel Gas Code (IFGC)

~~2021~~ 2024 International Energy Conservation Code (IECC)



- Section R314.2.2/R310.2.2: revised with correct 2024 IRC Section number. Typical for multiple sections throughout the BD.

~~26. 17.~~ Delete Exception 2 and change Exception 1 to Section ~~R314.6~~ R310.6 to read:

Exception: Smoke alarms shall be permitted to be battery operated with a minimum 10-year battery where installed in buildings without commercial power.

Base Documents cont. – Examples of Changes



- Table N1102.1.2 (R402.1.2): revised to match 2024 IRC/IECC table format and terminology but maintained existing Virginia amendment.



69. 76. Change the ~~frame~~ wood-framed wall U-factor categories for Climate Zones 3A, 4A, and 5A in Table N1102.1.2 (R402.1.2) to read:

	Frame Wall U-Factor
	<u>0.079</u>

<u>Table N1102.1.2(R402.1.2) Maximum Assembly U-Factors^a and Fenestration Requirements</u>			
<u>Climate Zone</u>	<u>3</u>	<u>4 Except Marine</u>	<u>5 and Marine 4</u>
<u>Wood-Framed Wall</u> <u>U-Factor</u>	<u>0.079</u>	<u>0.079</u>	<u>0.079</u>

Base Documents cont. – Examples of Changes



- Table N1102.5.1.1(R402.5.1.1) [formerly Table N1102.4.1.1 (R402.4.1.1)]: there have been several IECC changes/updates to the Table since the introduction of the Virginia amendments. The model code changes appear to accomplish the intent of existing Virginia amendments. Deleted existing amendments.



71. Change the title of the "Insulation Installation Criteria" category of Table N1102.4.1.1 (R402.4.1.1); change the "Shower/tub on exterior wall" category of Table N1102.4.1.1 (R402.4.1.1), and add footnotes "c" and "d" to Table N1102.4.1.1 (R402.4.1.1) to read:

Component	Air Barrier Criteria	Insulation Installation Criteria ^d
Shower/tub on exterior wall ^c	The air barrier installed at exterior walls adjacent to showers and tubs shall be installed on the interior side and separate the exterior walls from the showers and tubs.	Exterior walls adjacent to showers and tubs shall be insulated.

Base Documents cont. – Examples of Changes



- Section N1103.1.2 (R403.1.2): revised to eliminate conflicts with existing Virginia amendment to Section N1103.1.3 (R403.1.3).
- Section N1103.7.1 (R403.7.1) was also deleted for the same reason.



~~74.~~ 81. Add Change Section N1103.1.2 (R403.1.2) and add Section N1103.1.3 (R403.1.3) to read:

N1103.1.2 (R403.1.2) Heat pump supplementary heat. Heat pumps having supplementary electric-resistance, fuel gas or liquid fuel heating systems shall have controls that are configured so that, except during defrost or emergency heating modes, supplemental heating does not energize unless the outdoor temperature is below 40°F (4°C).

~~R403.1.3~~ N1103.1.3 (R403.1.3) Heat pump as primary space heat source. Electric resistance heat shall

~~77.~~ 84. Change Delete Section N1103.7.1 (R403.7.1) and change Section N1103.7 (R403.7) to read:

N1103.7 (R403.7) Equipment and appliance sizing. Heating and cooling equipment and appliances

Base Documents cont. – Examples of Changes



- **Section N1106.6 (R406.6):** Chapter 1 of the IRC is replaced with the Virginia specific Chapter 1. Revised with equivalent Virginia (Chapter 1) Section.



85. Change Section N1106.6 (R406.6) by replacing the reference to "Section R109.2" with reference to "Section 113.7".

- **Section 1301.1 (of the 2024 IBC):** replaced reference to Sections C101.2 and C101.3 of the IECC, which are unenforceable, with reference to Chapter 1 (of the Virginia Construction Code). Revised charging statement accordingly.

Add Change Section 1301.1 of the IBC and add Section 1301.1.1.1 to the IBC to read:

1301.1. Scope and intent. The scope and intent of this chapter shall be as indicated in Chapter 1.

Base Documents cont. – Examples of Changes



- **Section C403.2.2.1:** Section 401.2 of the 2021 IMC was amended to require all dwelling units to be provided with mechanical ventilation, thus the Virginia amendments to the VECC and VMC are no longer necessary. Deleted Virginia amendment.



~~3. Add Section C403.2.2.1 to read:~~

~~C403.2.2.1 Dwelling unit mechanical ventilation. Mechanical ventilation shall be provided for dwelling units in accordance with the IMC.~~

- **Section C405.4:** existing Virginia amendment no longer necessary as the intent of change is already addressed by Sections C405.5.1 and C405.5.2 of the 2024 IECC.

~~6. Change Section C405.4 to read:~~

~~C405.4 Exterior lighting. All exterior lighting, other than low voltage landscape lighting, shall comply with Section C405.4.1.~~

~~Exception: Where approved because of historical, safety, signage, or emergency considerations.~~

- All meetings are open to attendance and participation by anyone
- Review and discuss all submitted code change proposals, including all proposals and recommendations from Study Groups and Sub-Workgroups
- A workgroup recommendation is determined for each proposal and the recommendation is provided to the Board of Housing and Community Development
- Workgroup recommendations are classified as follows:

Consensus for Approval: No workgroup participant expressed opposition to the proposal

Non-Consensus: Any workgroup participant expressed opposition to the proposal

- Initial General Stakeholder Workgroup meeting(s) will be in July 2025
- Proposal Submission Deadline for the 2024 Code Development Cycle
October 8, 2025
- Final General Stakeholder Workgroup meeting(s) will be mid-November

- Study specific topics that require additional review and discussion
- Identify areas of consensus and disagreement
- Determine if code change proposals or other solutions are appropriate
- May review proposals, provide analysis, make recommendations, and/or develop code change proposals
- All code change proposals and any recommendations on code change proposals are reviewed by the General Workgroups and assigned a Workgroup recommendation prior to BHCD consideration

- Review and discuss code change proposals within their subject matter prior to the proposals being considered by the General Stakeholder Workgroup
- Address questions and concerns related to proposals to identify areas for compromise, where appropriate, in an effort to reach consensus
- May develop new code change proposals as determined appropriate
- Members may support proposals by joining the proposal as a proponent
- All code change proposals are reviewed by the General Workgroups and assigned a Workgroup recommendation prior to BHCD consideration

2024 Code Development Cycle Study Groups:

- Single Exit Stair Buildings
- Expediting Permits and Certificates of Occupancy
- Heating and Cooling
- Unsafe Structures

2024 Code Development Cycle Sub-workgroups:

- Energy
- Statewide Fire Prevention Code



Division of Building and Fire Regulations

State Building Codes Office

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804-371-7150



cdpVA

REC-R402.1.2(1)-24

IRC: TABLE N1102.1.2 (R402.1.2), TABLE N1102.1.3 (R402.1.3)

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2024 International Residential Code

Revise as follows:

TABLE N1102.1.2 (R402.1.2) MAXIMUM ASSEMBLY *U*-FACTORS^a AND FENESTRATION REQUIREMENTS

Portions of table not shown remain unchanged.

CLIMATE ZONE	3	4 EXCEPT MARINE	5 AND MARINE 4
CEILING <i>U</i> -FACTOR	0.030 0.026	0.026 0.024	0.026 0.024

For SI: 1 foot = 304.8 mm.

- Nonfenestration *U*-factors and *F*-factors shall be obtained from measurement, calculation, an approved source or Appendix NF where such appendix is adopted or approved.
- Mass walls shall be in accordance with Section N1102.2.6. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- In Warm Humid locations as defined by Figure N1101.7 and Table N1101.7, the *basement wall U*-factor shall not exceed 0.360.
- A maximum *U*-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - Above 4,000 feet in elevation above sea level, or
 - In windborne debris regions where protection of openings is required by Section R301.2.1.2.
- F*-factors for slabs shall correspond to the *R*-values of Table N1102.1.3 and the installation conditions of Section N1102.2.10.1.

TABLE N1102.1.3 (R402.1.3) INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT^a

Portions of table not shown remain unchanged.

CLIMATE ZONE	3	4 EXCEPT MARINE	5 AND MARINE 4
CEILING <i>R</i> -VALUE	38 49	49 60	49 60

For SI: 1 foot = 304.8 mm. NR = Not Required, ci = Continuous Insulation.

- R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
- “5ci or 13” means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “10ci or 13” means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “15ci or 19 or 13&5ci” means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
- Slab insulation shall be installed in accordance with Section N1102.2.10.1.
- Basement wall insulation shall not be required in Warm Humid locations as defined by Figure N1101.7 and Table N1101.7.

- e. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, “13&5” means R-13 cavity insulation plus R-5 continuous insulation.
- f. Mass walls shall be in accordance with Section N1102.2.6. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.
- g. A maximum *U*-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - 1. Above 4,000 feet in elevation.
 - 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.
- h. “30 or 19+7.5ci or 20ci” means R-30 cavity insulation alone or R-19 cavity insulation with R-7.5 continuous insulation or R-20 continuous insulation alone.

Reason Statement:

This proposal reverses an efficiency rollback incorporated into the 2024 *IECC* by restoring the ceiling insulation R-values to R-60 for Virginia's climate zones (which is the current requirement in the Uniform Construction Code). This requirement was rolled back in the 2024 *IECC* as part of a large compromise among *IECC*-Residential Development Committee Members referred to as the “omnibus.” However, significant portions of the omnibus related to electrification and decarbonization were removed from the 2024 *IECC* by the ICC Board of Directors as a result of several appeals, leaving in place several material efficiency rollbacks. These rollbacks would not have been approved in the 2024 *IECC* but for the omnibus compromise, and we recommend that Virginia adopt prescriptive envelope requirements at least as efficient as the 2021 *IECC*. Ceiling insulation is one of the longest-lasting efficiency measures in a building and will provide comfort and energy savings for occupants in all seasons, as well as improved passive survivability in the event of natural disasters and long-term power outages.

Cost Impact: The code change proposal will not increase or decrease the cost

This proposal will maintain Virginia's current ceiling insulation prescriptive baseline, so there will be no increase in construction costs. However, if Virginia reduces ceiling insulation requirements (per the 2024 *IECC*), this would increase costs for homeowners over the 70-100 year useful life of the building.

REC-R402.1.2(2)-24

VRC: TABLE N1102.1.2 (R402.1.2), TABLE N1102.1.3 (R402.1.3); VCC: 1301.1.1.1

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2021 Virginia Residential Code

Revise as follows:

TABLE N1102.1.2 (R402.1.2) MAXIMUM ASSEMBLY *U*-FACTORS^a AND FENESTRATION REQUIREMENTS

Portions of table not shown remain unchanged.

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR ^f	SKYLIGHT <i>U</i> -FACTOR	GLAZED FENESTRATION SHGC ^{d, e}	CEILING <i>U</i> -FACTOR	FRAME WALL <i>U</i> -FACTOR	MASS WALL <i>U</i> -FACTOR ^b	FLOOR <i>U</i> -FACTOR	BASEMENT WALL <i>U</i> -FACTOR	CRAWL SPACE WALL <i>U</i> -FACTOR
3	0.30	0.55	0.25	0.026	0.060 0.079	0.098	0.047	0.091c	0.136
4 except Marine	0.30	0.55	0.40	0.024	0.045 0.079	0.098	0.047	0.059	0.065
5 and Marine 4	0.30	0.55	0.40	0.024	0.045 0.079	0.082	0.033	0.050	0.055

For SI: 1 foot = 304.8 mm.

- Nonfenestration *U*-factors shall be obtained from measurement, calculation or an approved source.
- Mass walls shall be in accordance with Section R402.2.5. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- In Warm Humid locations as defined by Figure R301.1 and Table R301.1, the basement wall *U*-factor shall not exceed 0.360.
- The SHGC column applies to all glazed fenestration.

Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.
- There are no SHGC requirements in the Marine Zone.
- A maximum *U*-factor of 0.32 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - Above 4,000 feet in elevation above sea level, or
 - In windborne debris regions where protection of openings is required by Section R301.2.1.2.

TABLE N1102.1.3 (R402.1.3) INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT^a

Portions of table not shown remain unchanged.

CLIMATE ZONE	FENESTRATION <i>U</i> -FACTOR ^{b, i}	SKYLIGHT ^b <i>U</i> -FACTOR	GLAZED FENESTRATION SHGC ^{b, e}	CEILING <i>R</i> -VALUE	WOOD FRAME WALL <i>R</i> -VALUE ^g	MASS WALL <i>R</i> -VALUE ^h	FLOOR <i>R</i> -VALUE	BASEMENT ^{c, g} WALL <i>R</i> -VALUE	SLAB ^d <i>R</i> -VALUE & DEPTH	CRAWL SPACE ^{c, g} WALL <i>R</i> -VALUE
3	0.30	0.55	0.25	49	20 or 13&5ci or 08&15ci 45 or 13+4 ^g	8/13	19	5ci or 13 ^f	10ci, 2 ft	5ci or 13 ^f
4 except Marine	0.30	0.55	0.40	60	30 or 20&5ci or 13&10ci or 08&20ci 45 or 13+4 ^g	8/13	19	10ci or 13	10ci, 4 ft	10ci or 13

5 and Marine 4	0.30	0.55	0.40	60	30 or 20&5ci or 13&10ci or 0&20ci 15 or 13+19	13/17	30	15ci or 19 or 13&5ci	10ci, 4 ft	15ci or 19 or 13&5ci
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For SI: 1 foot = 304.8 mm.

NR = Not Required.

ci = continuous insulation.

- a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
- b. The fenestration *U*-factor column excludes skylights. The SHGC column applies to all glazed fenestration.
Exception: In Climate Zones 0 through 3, skylights shall be permitted to be excluded from glazed fenestration SHGC requirements provided that the SHGC for such skylights does not exceed 0.30.
- c. "5ci or 13" means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13&5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
- d. R-5 insulation shall be provided under the full slab area of a heated slab in addition to the required slab edge insulation *R*-value for slabs, as indicated in the table. The slab-edge insulation for heated slabs shall not be required to extend below the slab.
- e. There are no SHGC requirements in the Marine Zone.
- f. Basement wall insulation shall not be required in Warm Humid locations as defined by Figure N1101.7 and Table N1101.7.
- g. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, "13&5" means R-13 cavity insulation plus R-5 continuous insulation.
- h. Mass walls shall be in accordance with Section N1102.2.5. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.
- i. A maximum *U*-factor of 0.32 shall apply in Climate Zones 3 through 8 to vertical fenestration products installed in buildings located either:
 1. Above 4,000 feet in elevation, or
 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.

2021 Virginia Construction Code

Revise as follows:

1301.1.1.1 Changes to the *International Energy Conservation Code* (IECC). The following changes shall be made to the IECC :

14. Change the wood frame wall *R* value categories for Climate Zones 3A, 4A and 5A in Table R402.1.3 to read:

		Wood Frame Wall <i>R</i> -Value
		15 or 13+1 st

15. Change the frame wall *U* factor categories for Climate Zones 3A, 4A and 5A in Table R402.1.2 to read:

		Frame Wall <i>U</i> Factor
		0.079

Reason Statement:

This proposal will reduce energy costs for homeowners and improve comfort and passive survivability in new homes by adopting the wall insulation requirements as they appear in the 2021 and 2024 IECC. Virginia is now several cycles behind the model energy code in requirements that apply to wall insulation.

	IECC Wall Insulation R-Value (CZ4)	VA UCC Wall Insulation R-Value (CZ4)
2009	13	13
2012	20 or 13+5	15 or 13+1
2015	20 or 13+5	15 or 13+1
2018	20 or 13+5	15 or 13+1
2021	30 or 20+5 or 13+10 or 0+20	15 or 13+1
2024	30 or 20+5 or 13+10 or 0+20	

Virginia currently allows 75% higher wall U-factors (less stringent) than the 2021/24 IECC. That means Virginia homes allow 75% more heat transfer through the opaque walls than a home built to the 2021 or 2024 IECC. While we understand that initial construction costs are higher with increased insulation requirements, the long-term benefits in lower energy bills and increased comfort for the building owners/occupants are well-documented. Wall insulation is most cost-effectively installed at construction and is likely to remain unchanged over the useful life of the building. The homes constructed today will generate roughly 1200 utility bills (100 years x 12 months), and the amount of wall insulation will directly impact what the homeowner pays every month. It is critical to build new homes to reduce energy use wherever feasible, particularly in the systems and components that will last the longest. Because the IECC provides a wide range of compliance options -- prescriptive, Total UA, simulated performance, Energy Rating Index -- an increase in wall insulation requirements may not require a complete redesign of the proposed home, as long as the home achieves the same overall level of energy savings.

Cost Impact: The code change proposal will increase the cost

In its analysis for the efficiency improvements in the 2021 IECC, the U.S. Department of Energy estimated that the increased construction cost of an additional R-5 continuous insulation would be \$0.98/ft² wall area, or \$374.96 for the multifamily prototype/\$1,961.96 for the single-family prototype. This improvement was part of a 30-year life-cycle energy cost savings of \$2,243 in climate zone 4, with an estimated payback period of 12.4 years. See U.S. Department of Energy, *National Cost-Effectiveness of the Residential Provisions of the 2021 IECC* (June 2021).

REC-R402.1.2(3)-24

IRC: TABLE N1102.1.2 (R402.1.2), TABLE N1102.1.3 (R402.1.3)

Proponents: Jason Vandever, North American Insulation Manufacturers Association (NAIMA), representing NAIMA (jvandever@naima.org)

2024 International Residential Code

Revise as follows:

TABLE N1102.1.2 (R402.1.2) MAXIMUM ASSEMBLY *U*-FACTORS^a AND FENESTRATION REQUIREMENTS

Portions of table not shown remain unchanged.

CLIMATE ZONE	3	4 EXCEPT MARINE	5 AND MARINE 4
ATTIC ROOFLINE <i>U</i> -FACTOR	0.039	0.032	0.032

For SI: 1 foot = 304.8 mm.

- a. Nonfenestration *U*-factors and *F*-factors shall be obtained from measurement, calculation, an approved source or Appendix NF where such appendix is adopted or approved.
- b. Mass walls shall be in accordance with Section N1102.2.6. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- c. In Warm Humid locations as defined by Figure N1101.7 and Table N1101.7, the *basement wall U*-factor shall not exceed 0.360.
- d. A maximum *U*-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - 1. Above 4,000 feet in elevation above sea level, or
 - 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.
- e. *F*-factors for slabs shall correspond to the *R*-values of Table N1102.1.3 and the installation conditions of Section N1102.2.10.1.

TABLE N1102.1.3 (R402.1.3) INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT^a

Portions of table not shown remain unchanged.

CLIMATE ZONE	3	4 EXCEPT MARINE	5 AND MARINE 4
ATTIC ROOFLINE <i>R</i> -VALUE	30	38	38

For SI: 1 foot = 304.8 mm.NR = Not Required, ci = Continuous Insulation.

- a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
- b. “5ci or 13” means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “10ci or 13” means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. “15ci or 19 or 13&5ci” means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
- c. Slab insulation shall be installed in accordance with Section N1102.2.10.1.

- d. Basement wall insulation shall not be required in Warm Humid locations as defined by Figure N1101.7 and Table N1101.7.
- e. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, “13&5” means R-13 cavity insulation plus R-5 continuous insulation.
- f. Mass walls shall be in accordance with Section N1102.2.6. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.
- g. A maximum *U*-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - 1. Above 4,000 feet in elevation.
 - 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2.
- h. “30 or 19+7.5ci or 20ci” means R-30 cavity insulation alone or R-19 cavity insulation with R-7.5 continuous insulation or R-20 continuous insulation alone.

Reason Statement: This proposal provides more compliance alternatives for insulating ceilings/roofs, while also maintaining equivalence with the current prescriptive requirements. During the development of the 2024 IECC, new rows in the prescriptive U-factor and R-value tables were added for "insulation entirely above roof deck". We support this change, and we assume that it will be included in the base document update for Virginia's 2024 IECC adoption. The proposal above adds another row to the prescriptive insulation tables that we believe will promote good construction practices and provide an equivalent level of energy savings. In the 2027 IECC, proposal RE30-24 added new rows for "attic roofline U-factor" and "attic roofline R-value". The U-factors were selected to align with the 2024 IECC addition of "insulation entirely above roof deck" and the appropriate R-values were selected after calculation of typical roof assemblies- to align the thermal resistance with the U-factors. The U-factors and R-values in the RE30-24 proposal were unanimously approved at the subgroup and unanimously approved at the Residential Consensus Committee with a vote of 35-0. Note: The U-factors and R-values proposed above are calculated to be equivalent to an R-49 ceiling insulation requirement, which reflects the reduction in ceiling insulation in the 2024 IECC. If Virginia maintains its current ceiling R-value requirement of R-60, we can re-calculate these values to maintain equivalence.

Cost Impact: The code change proposal will not increase or decrease the cost
This proposal is an option and will neither increase or decrease costs.

Attached Files

- RE30-24_1751383997.pdf
<https://va.cdpaccess.com/proposal/1337/1902/files/download/926/>

Proponents: Aaron Gary, representing Self (aaron.gary@texenergy.org)

2024 International Energy Conservation Code [RE Project]

Revise as follows:

TABLE R402.1.2 MAXIMUM ASSEMBLY *U*-FACTORS^a AND FENESTRATION REQUIREMENTS

CLIMATE ZONE	0	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7 AND 8
Vertical fenestration <i>U</i> -factor	0.50	0.50	0.40	0.30	0.30	0.28 ^d	0.28 ^d	0.27 ^d
Skylight <i>U</i> -factor	0.60	0.60	0.60	0.53	0.53	0.50	0.50	0.50
Glazed vertical fenestration SHGC	0.25	0.25	0.25	0.25	0.40	NR	NR	NR
Skylight SHGC	0.28	0.28	0.28	0.28	0.40	NR	NR	NR
Ceiling <i>U</i> -factor	0.035	0.035	0.030	0.030	0.026	0.026	0.026	0.026
Attic Roofline <i>U</i> -factor	0.039	0.039	0.039	0.039	0.032	0.032	0.032	0.028
Insulation entirely above roof deck	0.039	0.039	0.039	0.039	0.032	0.032	0.032	0.028
Wood-framed wall <i>U</i> -factor	0.084	0.084	0.084	0.060	0.045	0.045	0.045	0.045
Mass wall <i>U</i> -factor ^b	0.197	0.197	0.165	0.098	0.098	0.082	0.060	0.057
Floor <i>U</i> -factor	0.064	0.064	0.064	0.047	0.047	0.033	0.033	0.028
Basement wall <i>U</i> -factor	0.360	0.360	0.360	0.091 ^c	0.059	0.050	0.050	0.050
Unheated slab <i>F</i> -factor ^e	0.73	0.73	0.73	0.54	0.51	0.51	0.48	0.48
Heated slab <i>F</i> -factor ^e	0.74	0.74	0.74	0.66	0.66	0.66	0.66	0.66
Crawl space wall <i>U</i> -factor	0.477	0.477	0.477	0.136	0.065	0.055	0.055	0.055

For SI: 1 foot = 304.8 mm.

- Nonfenestration *U*-factors and *F*-factors shall be obtained from measurement, calculation, an *approved source*, or Appendix RF where such appendix is adopted or *approved*.
- Mass walls shall be in accordance with Section R402.2.6. Where more than half the insulation is on the interior, the mass wall *U*-factors shall not exceed 0.17 in Climate Zones 0 and 1, 0.14 in Climate Zone 2, 0.12 in Climate Zone 3, 0.087 in Climate Zone 4 except Marine, 0.065 in Climate Zone 5 and Marine 4, and 0.057 in Climate Zones 6 through 8.
- In Warm Humid locations as defined by Figure R301.1 and Table R301.1, the basement wall *U*-factor shall not exceed 0.360.
- A maximum *U*-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 - Above 4,000 feet in elevation above sea level, or
 - In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the *International Residential Code*.
- F*-factors for slabs shall correspond to the *R*-values of Table R402.1.3 and the installation conditions of Section R402.2.10.1.

TABLE R402.1.3 INSULATION MINIMUM *R*-VALUES AND FENESTRATION REQUIREMENTS BY COMPONENT^a

CLIMATE ZONE	0	1	2	3	4 EXCEPT MARINE	5 AND MARINE 4	6	7 AND 8
Vertical fenestration <i>U</i> -factor	0.50	0.50	0.40	0.30	0.30	0.28 ^g	0.28 ^g	0.27 ^g
Skylight <i>U</i> -factor	0.60	0.60	0.60	0.53	0.53	0.50	0.50	0.50
Glazed vertical fenestration SHGC	0.25	0.25	0.25	0.25	0.40	NR	NR	NR
Skylight SHGC	0.28	0.28	0.28	0.28	0.40	NR	NR	NR
Ceiling <i>R</i> -value	30	30	38	38	49	49	49	49
Insulation entirely above roof deck	25ci	25ci	25ci	25ci	30ci	30ci	30ci	35ci
Attic Roofline <i>R</i> -value	30&0ci	30&0ci	30&0ci	30&0ci	38&0ci	38&0ci	38&0ci	41&0ci
Wood-framed wall <i>R</i> -value ^e	13 or 0&10ci	13 or 0&10ci	13 or 0&10ci	20 or 13&5ci or 0&15ci	30 or 20&5ci or 13&10ci or 0&20ci	30 or 20&5ci or 13&10ci or 0&20ci	30 or 20&5ci or 13&10ci or 0&20ci	30 or 20&5ci or 13&10ci or 0&20ci

Mass wall <i>R</i> -value ^a	3/4	3/4	4/6	8/13	8/13	13/17	15/20	19/21
Floor <i>R</i> -value ^h	13 or 7+5ci or 10ci	13 or 7+5ci or 10ci	13 or 7+5ci or 10ci	19 or 13+5ci or 15ci	19 or 13+5ci or 15ci	30 or 19+7.5ci or 20ci	30 or 19+7.5ci or 20ci	38 or 19+10ci or 25ci
Basement wall <i>R</i> -value ^{b, e}	0	0	0	5ci or 13 ^d	10ci or 13	15ci or 19 or 13&5ci	15ci or 19 or 13&5ci	15ci or 19 or 13&5ci
Unheated slab <i>R</i> -value & depth ^c	0	0	0	10ci, 2 ft	10ci, 3 ft	10ci, 3 ft	10ci, 4 ft	10ci, 4 ft
Heated slab <i>R</i> -value & depth ^c	R-5ci edge and R-5 full slab	R-5ci edge and R-5 full slab	R-5ci edge and R-5 full slab	R-10ci, 2 ft and R-5 full slab	R-10ci, 3 ft and R-5 full slab	R-10ci, 3 ft and R-5 full slab	R-10ci, 4 ft and R-5 full slab	R-10ci, 4 ft and R-5 full slab
Crawl space wall <i>R</i> -value ^{b, e}	0	0	0	5ci or 13 ^d	10ci or 13	15ci or 19 or 13&5ci	15ci or 19 or 13&5ci	15ci or 19 or 13&5ci

For SI: 1 foot = 304.8 mm.

NR = Not Required, ci = Continuous Insulation.

- a. *R*-values are minimums. *U*-factors and SHGC are maximums. Where insulation is installed in a cavity that is less than the label or design thickness of the insulation, the installed *R*-value of the insulation shall be not less than the *R*-value specified in the table.
- b. "5ci or 13" means R-5 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "10ci or 13" means R-10 continuous insulation (ci) on the interior or exterior surface of the wall or R-13 cavity insulation on the interior side of the wall. "15ci or 19 or 13&5ci" means R-15 continuous insulation (ci) on the interior or exterior surface of the wall; or R-19 cavity insulation on the interior side of the wall; or R-13 cavity insulation on the interior of the wall in addition to R-5 continuous insulation on the interior or exterior surface of the wall.
- c. Slab insulation shall be installed in accordance with Section R402.2.10.1.
- d. Basement wall insulation is not required in Warm Humid locations as defined by Figure R301.1 and Table R301.1.
- e. The first value is cavity insulation; the second value is continuous insulation. Therefore, as an example, "13&5" means R-13 cavity insulation plus R-5 continuous insulation.
- f. Mass walls shall be in accordance with Section R402.2.6. The second *R*-value applies where more than half of the insulation is on the interior of the mass wall.
- g. A maximum *U*-factor of 0.30 shall apply in Marine Climate Zone 4 and Climate Zones 5 through 8 to vertical fenestration products installed in buildings located either:
 1. Above 4,000 feet in elevation.
 2. In windborne debris regions where protection of openings is required by Section R301.2.1.2 of the *International Residential Code*.
- h. "30 or 19+7.5ci or 20ci" means R-30 cavity insulation alone or R-19 cavity insulation with R-7.5 continuous insulation or R-20 continuous insulation alone.

Reason: Providing insulation below the roof deck in a sealed attic meets the same intent and savings as insulation above the roof deck but at lower cost.

Cost Impact: The code change proposal will neither increase nor decrease the cost of construction.

Providing an additional option on how to insulate and attic provides more flexibility allowing construction professionals to select the most cost effective solution, without degrading the energy performance of the home.

Cost Impact (Detailed): The change proposal is editorial in nature or a clarification and has no cost impact on the cost of construction

Justification: Provides more flexibility without degrading energy performance.

REC-R402.4.1.2-24

VRC: N1102.4.1.2, N1102.4.1.3; VCC: 1301.1.1.1

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2021 Virginia Residential Code

Delete without substitution:

N1102.4.1.2 (R402.4.1.2) Testing. ~~The building or dwelling unit shall be tested and verified as having an air leakage rate not exceeding 5 air changes per hour. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779, or ASTM E1827 and reported at a pressure of 0.2 inches w.g. (50 Pa). A written report of the results of the test shall be signed by the party conducting the test and provided to the building official. Testing shall be conducted by a Virginia licensed general contractor, a Virginia licensed HVAC contractor, a Virginia licensed home inspector, a Virginia registered design professional, a certified BPI Envelope Professional, a certified HERS rater, or a certified duct and envelope tightness rater. The party conducting the test shall have been trained on the equipment used to perform the test. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.~~

~~**Note:** Should additional sealing be required as a result of the test, consideration may be given to the issuance of temporary certificate of occupancy in accordance with Section 116.1.1.~~

~~**During testing:**~~

- ~~1. Exterior windows and doors and fireplace and stove doors shall be closed, but not sealed beyond the intended weather stripping or other infiltration control measures;~~
- ~~2. Dampers, including exhaust, intake, makeup air, backdraft, and flue dampers shall be closed, but not sealed beyond intended infiltration control measures;~~
- ~~3. Interior doors, if installed at the time of the test, shall be open;~~
- ~~4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed;~~
- ~~5. Heating and cooling systems, if installed at the time of the test, shall be turned off; and~~
- ~~6. Supply and return registers, if installed at the time of the test, shall be fully open.~~

~~**Exception:** When testing individual dwelling units, an air leakage rate not exceeding 0.30 cubic feet per minute per square foot [$0.008 \text{ m}^3/(\text{s} \times \text{m}^2)$] of the dwelling unit enclosure area, tested in accordance with ANSI/RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch water gauge (50 Pa), shall be permitted in all climate zones for:~~

- ~~1. Attached single and multiple family building dwelling units.~~
- ~~2. Buildings or dwelling units that are 1,500 square feet (139.4 m^2) or smaller.~~

~~Mechanical ventilation shall be provided in accordance with Section M1505 of this code or Section 403.3.2 of the *International Mechanical Code*, as applicable, or with other approved means of ventilation.~~

N1102.4.1.3 (R402.4.1.3) Leakage rate. ~~When complying with Section N1101.2.1 (R401.2.1), the building or dwelling unit shall have an air leakage rate not exceeding 5 air changes per hour in Climate Zones 3 through 5, when tested in accordance with Section N1102.4.1.2 (R402.4.1.2).~~

2021 Virginia Construction Code

Revise as follows:

1301.1.1.1 Changes to the *International Energy Conservation Code* (IECC). The following changes shall be made to the IECC:

19: Change Section R402.4.1.2 of the IECC to read:

R402.4.1.2 Testing. The *building* or dwelling unit shall be tested and verified as having an air leakage rate not exceeding five air changes per hour. Testing shall be conducted in accordance with RESNET/ICC 380, ASTM E779 or ASTM E1827 and reported at a pressure of 0.2 inch w.g. (50 Pascals). A written report of the results of the test shall be signed by the party conducting the test and provided to the building official. Testing shall be conducted by a Virginia licensed general contractor, a Virginia licensed HVAC contractor, a Virginia licensed home inspector, a Virginia *registered design professional*, a certified BPI Envelope Professional, a certified HERS rater, or a certified duct and envelope tightness rater. The party conducting the test shall have been trained on the equipment used to perform the test. Testing shall be performed at any time after creation of all penetrations of the building thermal envelope.

Note: Should additional sealing be required as a result of the test, consideration may be given to the issuance of a temporary certificate of occupancy in accordance with Section 116.1.1.

During testing:

1. Exterior windows and doors and fireplace and stove doors shall be closed, but not sealed beyond the intended weatherstripping or other infiltration control measures.
2. Dampers, including exhaust, intake, makeup air, backdraft and flue dampers, shall be closed, but not sealed beyond intended infiltration control measures.
3. Interior doors, if installed at the time of the test, shall be open.
4. Exterior doors for continuous ventilation systems and heat recovery ventilators shall be closed and sealed.
5. Heating and cooling systems, if installed at the time of the test, shall be turned off.
6. Supply and return registers, if installed at the time of the test, shall be fully open.

20: Change Section R402.4.1.3 of the IECC to read:

R402.4.1.3 Leakage rate. When complying with Section R401.2.1, the building or dwelling unit shall have an air leakage rate not exceeding 5.0 air changes per hour in Climate Zones 3 through 5, when tested in accordance with Section R402.4.1.2.

Reason Statement:

This proposal would improve the efficiency and durability of residential buildings and help maintain healthier indoor air quality by incorporating the air leakage testing requirements of the 2024 IECC into Virginia's code. Since the 2012 edition, the IECC has required all new residential dwellings in Virginia's climate zones to be tested and to verify a maximum total envelope leakage of 3.0 ACH50. However, Virginia did not adopt a testing requirement until the 2018 edition of the VCC, and set the maximum leakage allowance at 5.0 ACH50. That requirement remained unchanged in the 2021 VCC update, even though the 2021 IECC adopted additional flexibility that allows code users several alternatives for meeting the air tightness requirements. We believe Virginia is ready to catch up with the IECC envelope air leakage requirements. A well-sealed, verified thermal envelope will provide energy savings and promote better indoor air quality over the 70- to 100-year useful life of the home.

This proposal intends to delete the VA-specific amendments in order to incorporate the 2024 IECC air leakage testing requirements as published. This would result in the following changes:

1. All new dwelling units would be required to be air leakage tested, but the maximum allowable leakage for prescriptive compliance would improve from 5.0 ACH50 to 3.0 ACH50 in all Virginia climate zones.
2. The performance path baseline (R405) would be set at 3.0 ACH50, but dwellings could test as high as 5.0 ACH50 as long as efficiency losses are accounted for in other efficiency improvements. This allows considerable flexibility for code users who still find it challenging to achieve 3.0 ACH50, while maintaining the same overall efficiency required by the code.

3. Multifamily dwelling units (of any size) and buildings with 1500 square feet or less of conditioned floor area have the option to be tested to 0.27 cfm/min/ft² of testing unit enclosure area. This will help address the challenges of achieving low ACH in smaller dwellings.

Cost Impact: The code change proposal will increase the cost

It is possible that some additional time or materials will be required to achieve the lower air leakage number; however, we note that the largest cost is typically the cost of the blower door test itself, which is already required under the VA UCC.

REC-R405.2-24

IRC: N1105.2 (R405.2), TABLE N1105.4.2(1) [R405.4.2(1)]

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2024 International Residential Code

Revise as follows:

N1105.2 (R405.2) Simulated building performance compliance. Compliance based on *simulated building performance* requires that a *building* comply with the following:

- 1. The requirements of the sections indicated within Table N1105.2.
- 2. The proposed total *building thermal envelope* thermal conductance (TC) shall be less than or equal to the required total *building thermal envelope* TC using the prescriptive *U-factors* and *F-factors* from Table N1102.1.2 multiplied by 1.08 in *Climate Zones* 0, 1 and 2, and 1.15 in *Climates Zones* 3 through 8, in accordance with Equation 11-6 and Section N1102.1.5. The area-weighted maximum *fenestrationSHGC* permitted in *Climate Zones* 0 through 3 shall be 0.30.

For *Climate Zones* 0–2: $TC_{Proposed\ design} \leq 1.08 \times TC_{Prescriptive\ reference\ design}$

For *Climate Zones* 3–8: $TC_{Proposed\ design} \leq 1.15 \times TC_{Prescriptive\ reference\ design}$

Equation 11-6

- 3. For each *dwelling unit* ~~with one or more fuel burning appliances for space heating, water heating, or both, the annual energy cost of the dwelling unit shall be less than or equal to 80 percent of the annual energy cost of the standard reference design. For all other dwelling units,~~ the annual *energy cost* of the *proposed design* shall be less than or equal to ~~80~~ 85 percent of the annual *energy cost* of the *standard reference design*. For each *dwelling unit* with greater than 5,000 square feet (465 m²) of *living space* located above *grade plane*, the annual *energy cost* of the *dwelling unit* shall be reduced by an additional 5 percent of annual *energy cost* of the *standard reference design*. Energy prices shall be taken from an *approved source*, such as the US Energy Information Administration’s State Energy Data System prices and expenditures reports. Code officials shall be permitted to require time-of-use pricing in *energy cost* calculations.

Exceptions:

- 1. The energy use based on source energy expressed in *Btu* or *Btu* per square foot of *conditioned floor area* shall be permitted to be substituted for the *energy cost*. The source energy multiplier for electricity shall be 2.51 . The source energy multipliers shall be 1.09 for natural gas, 1.15 for propane, 1.19 for *fuel oil*, and 1.30 for imported liquified natural gas.
- 2. The energy use based on site energy expressed in *Btu* or *Btu* per square foot of *conditioned floor area* shall be permitted to be substituted for the *energy cost*.

TABLE N1105.4.2(1) [R405.4.2(1)] SPECIFICATIONS FOR THE STANDARD REFERENCE AND PROPOSED DESIGNS
Portions of table not shown remain unchanged.

BUILDING COMPONENT	STANDARD REFERENCE DESIGN	PROPOSED DESIGN
Heating systems ^{d, e, j, k}	Fuel Type/Capacity: same as proposed design.	As proposed.
	Product class: same as proposed design.	As proposed.
	Efficiencies: For other than electric heating without a heat pump: same as proposed design.	As proposed.
	Where the proposed design utilizes electric heating without a heat pump, the standard reference design shall be an air source heat pump meeting the requirements of Section C403 of the <i>IECC – Commercial Provisions</i> .	
	Heat pump: complying with 10 CFR §430.32	As proposed
	Fuel gas and liquid fuel furnaces: complying with 10 CFR §430.32	As proposed.
	Fuel gas and liquid fuel boilers: complying with 10 CFR §430.32	As proposed.

BUILDING COMPONENT	STANDARD REFERENCE DESIGN				PROPOSED DESIGN		
Cooling systems ^{d, f, k}	Fuel Type: electric				As proposed.		
	Capacity: same as proposed design				As proposed.		
	Efficiencies: complying with 10 CFR §430.32 Same as proposed design.				As proposed.		
Service water heating ^{d, g, k}	Use, in units of gal/day = $25.5 + (8.5 \times N_{br})$ where: N_{br} = number of bedrooms.				Use, in units of gal/day = $25.5 + (8.5 \times N_{br}) \times (1 - HWDS)$ where: N_{br} = number of bedrooms. $HWDS$ = factor for the compactness of the hot water distribution system.		
					Compactness ratio ^l factor		HWDS
					1 story	2 or more stories	
					> 60%	> 30%	0
					> 30% to ≤ 60%	> 15% to ≤ 30%	0.05
					> 15% to ≤ 30%	> 7.5% to ≤ 15%	0.10
	< 15%	< 7.5%	0.15				
	Fuel type: same as proposed design				As proposed.		
	Rated storage volume: same as proposed design				As proposed.		
	Draw pattern: same as proposed design				As proposed.		
Efficiencies: Uniform Energy Factor complying with 10 CFR §430.32 Same as proposed design.				As proposed.			
Tank temperature: 120° F (48.9° C)				Same as standard reference design.			
Thermal distribution systems	Duct insulation: in accordance with Section N1103.3.3.				Duct insulation: as proposed. ^m		
	Duct location: <u>Same as proposed design.</u>				Duct location: as proposed. ^l		
	Foundation type	Slab on grade	Unconditioned crawl space	Basement or conditioned crawl space	—		
	Duct location (supply and return)	One-story building: 100% in unconditioned attic All other: 75% in unconditioned attic and 25% inside conditioned space	One-story building: 100% in unconditioned crawl space All other: 75% in unconditioned crawl space and 25% inside conditioned space	75% inside conditioned space 25% unconditioned attic	Duct system leakage to outside: The measured total duct system leakage rate shall be entered into the software as the duct system leakage to outside rate. Exceptions:		
	Duct system leakage to outside: for duct systems serving > 1,000 ft ² of conditioned floor area, the duct leakage to outside rate shall be 4 cfm per 100 ft ² of conditioned floor area. For duct systems serving ≤ 1,000 ft ² of conditioned floor area, the duct leakage to outside rate shall be 40 cfm.				1	Where duct system leakage to outside is tested in accordance ANSI/RESNET/ICC 380 or ASTM E1554, the measured value shall be permitted to be entered.	
					2	Where total duct system leakage is measured without space conditioning equipment installed, the simulation value shall be 4 cfm per 100ft ² of conditioned floor area.	
	Distribution System Efficiency (DSE): for hydronic systems and ductless systems a thermal distribution system efficiency (DSE) of 0.88 shall be applied to both the heating and cooling system efficiencies.				Distribution System Efficiency (DSE): for hydronic systems and ductless systems, DSE shall be as specified in Table N1105.4.2(2).		

For SI: 1 square foot = 0.93 m², 1 British thermal unit = 1055 J, 1 pound per square foot = 4.88 kg/m², 1 gallon (US) = 3.785 L, °C = (°F – 32)/1.8, 1 degree = 0.79 rad, 1 cubic foot per minute = 28.317 L/min.

- Hourly calculations as specified in the ASHRAE Handbook of Fundamentals , or the equivalent, shall be used to determine the energy loads resulting from infiltration.
- The combined air exchange rate for infiltration and mechanical ventilation shall be determined in accordance with Equation 43 of 2001 ASHRAE Handbook of Fundamentals , page 26.24 and the “Whole-house Ventilation” provisions of 2001 ASHRAE Handbook of Fundamentals , page 26.19 for intermittent mechanical ventilation.
- Thermal storage element shall mean a component that is not part of the floors, walls or ceilings that is part of a passive solar system, and that provides thermal storage such as enclosed water columns, rock beds, or phase-change containers. A thermal storage element shall be in the same room as fenestration that faces within 15 degrees (0.26 rad) of true south, or shall be connected to such a room with pipes or ducts that allow the element to be actively charged.
- For a proposed design with multiple heating, cooling or water heating systems using different fuel types, the applicable standard reference design system capacities and fuel types shall be weighted in accordance with their respective loads as calculated by accepted engineering practice for each equipment and fuel type present.
- For a proposed design without a proposed heating system, a heating system having the prevailing federal minimum efficiency shall be assumed for both the standard reference design and proposed design.

- f. For a proposed design without a proposed cooling system, an electric air conditioner having the prevailing federal minimum efficiency shall be assumed for both the standard reference design and the proposed design.
- g. For a proposed design with a nonstorage-type water heater, For a proposed design without a proposed water heater, the following assumptions shall be made for both the proposed design and standard reference design. For a proposed design with a heat pump water heater, the following assumptions shall be made for the standard reference design, except the fuel type shall be electric:

Fuel Type: Same as the predominant heating fuel type

Rated Storage Volume: 40 gallons

Draw Pattern: Medium

Efficiency: Uniform Energy Factor complying with 10 CFR §430.32

- h. For residences with conditioned basements, R-2 and R-4 residences, and for townhouses, the following formula shall be used to determine glazing area:

$$AF = A_S \times FA \times F$$

where:

AF = Total glazing area.

A_S = Standard reference design total glazing area.

FA = (Above-grade thermal boundary gross wall area)/(above-grade boundary wall area + 0.5 × below-grade boundary wall area).

F = (above-grade thermal boundary wall area)/(above-grade thermal boundary wall area + common wall area) or 0.56, whichever is greater.

and where:

- Thermal boundary wall is any wall that separates conditioned space from unconditioned space or ambient conditions.
- Above-grade thermal boundary wall is any thermal boundary wall component not in contact with soil.
- Below-grade boundary wall is any thermal boundary wall in soil contact.
- Common wall area is the area of walls shared with an adjoining dwelling unit.

- i. The factor for the compactness of the hot water distribution system is the ratio of the area of the rectangle that bounds the source of hot water and the fixtures that it serves (the “hot water rectangle”) divided by the floor area of the dwelling.
 - 1. Sources of hot water include water heaters, or in multiple-family buildings with central water heating systems, circulation loops or electric heat traced pipes.
 - 2. The hot water rectangle shall include the source of hot water and the points of termination of all hot water fixture supply piping.
 - 3. The hot water rectangle shall be shown on the floor plans and the area shall be computed to the nearest square foot.
 - 4. Where there is more than one water heater and each water heater serves different plumbing fixtures and appliances, it is permissible to establish a separate hot water rectangle for each hot water distribution system and add the area of these rectangles together to determine the compactness ratio.
 - 5. The basement or attic shall be counted as a story when it contains the water heater.
 - 6. Compliance shall be demonstrated by providing a drawing on the plans that shows the hot water distribution system rectangle(s), comparing the area of the rectangle(s) to the area of the dwelling and identifying the appropriate compactness ratio and *HWDS* factor.
- j. For a proposed design with electric resistance heating, a split system heat pump complying with 10 CFR §430.32 (2021) shall be assumed modeled in the standard reference design.
- k. For heating systems, cooling systems, or water heating systems not included in this table, the standard reference design shall be the same as proposed design.
- l. Only sections of ductwork that are installed in accordance with Section N1103.3.4, Items 1 and 2 are assumed to be located completely inside conditioned space. All other sections of ductwork are not assumed to be located completely inside conditioned space.
- m. Sections of ductwork installed in accordance with Section N1103.3.5.1 are assumed to have an effective duct insulation *R*-value of R-25.

Reason Statement:

The proposed changes above will reverse the largest efficiency rollbacks incorporated into the 2024 *IECC* and maintain Virginia's current performance path approach to efficiency trade-offs for heating, cooling, and water heating equipment. It will also eliminate an unnecessary new credit for duct location. The proposal will also incorporate a single efficiency improvement to buildings with all equipment types based on the U.S. Department of Energy's Determination that the 2024 *IECC* reduced annual energy costs by roughly 6.6% as compared to the 2021 *IECC*. We believe the combination of these changes will allow Virginia code users to continue to use the performance path essentially as they do today, avoiding the controversies that have accompanied the 2024 *IECC* revisions to this section.

All of these new trade-off credits were included in the 2024 *IECC* as part of a large compromise among *IECC*-R Development Committee Members referred to as the “omnibus.” However, significant portions of the omnibus related to electrification and decarbonization were removed from the 2024 *IECC* by the ICC Board of Directors as a result of several appeals, leaving in place several material efficiency rollbacks. These rollbacks would not have been approved in the 2024 *IECC* but for the omnibus compromise, and we recommend that Virginia eliminate these trade-off credits to be consistent with the 2021 *IECC* and the current VA Construction Code approach to equipment efficiency in the performance path.

Equipment trade-offs were correctly eliminated in the 2009 version of the *IECC* (and in Virginia's adoption of the 2009 IRC/*IECC*) and were consistently rejected in every *IECC* and Virginia code update cycle until the ICC Residential Committee-developed 2024 *IECC*. Nearly every state that adopts the *IECC* has eliminated these trade-offs as well. Equipment trade-offs reduce building efficiency because commonly installed cooling, heating, and water heating equipment typically exceeds the federal minimum efficiencies, but states are unable to set more reasonable efficiency requirements (or more reasonable assumptions in the standard reference design baseline) because of federal preemption. **The result is an unwarranted trade-off credit that allows buildings to be constructed 11-22% less efficient overall than if the trade-offs were not allowed.** See ICF International, *Review and Analysis of Equipment Trade-offs in Residential Energy Codes*, at ii (Sep. 23, 2013).

Although proponents of equipment trade-offs argue that they are “energy neutral,” the reality is that they are a short-term trade-off that will

have long-term negative impacts on homeowners—who are often unaware that such trade-offs are taking place. For example, if a trade-off is permitted for water heater efficiency, an instantaneous natural gas water heater would allow the builder to reduce the efficiency of the rest of the home by an average of 9%. The remaining home will be 9% less efficient for its entire useful lifetime. As the water heater is replaced every 10-15 years, the envelope of that home will continue to underperform by 9%. By contrast, under the current Virginia Construction Code (and the 2021 *IECC*), no trade-off credit is awarded for the instantaneous water heater, which means the rest of the home will be built to meet the code. As the water heater is swapped out in future years, a home built to the current Virginia UCC-compliant home will outperform a home built using a water heater performance trade-off allowed by 9%.

Regarding duct location, the current Virginia Uniform Construction Code does not award performance path trade-off credit for ducts located inside conditioned space. In both the prescriptive path and the performance path, builders are neither penalized nor credited for the location of duct systems. Although it is generally good building practice to locate all ducts and air handlers inside conditioned space, many builders in Virginia already do this.

The 2024 *IECC* already provides another performance-based alternative that provides credit for equipment efficiency and duct location (the Energy Rating Index), as well as multiple credits for equipment and duct location in Table R408.2. Both of these compliance paths do not carry such a high risk of free ridership (and reduced overall efficiency) as the proposed performance path credits. The simulated performance path lacks several of the built-in protections of the ERI path, and thus cannot guarantee an equivalent level of performance. We strongly recommend eliminating these loopholes from the performance path and implementing provisions consistent with the Virginia Construction Code and the 2021 *IECC*.

Finally, this proposal replaces the two multipliers in Section N1105.2(3)/R405.2(3) with a single multiplier. Although we do not oppose setting a different multiplier based on whether a home uses fossil fuel-fired or electric appliances, for a starting place we recommend setting a multiplier that is consistent with the U.S. Department of Energy's Determination on energy cost savings associated with the prescriptive path of the 2024 *IECC*, and one that properly reflects the impact of equipment trade-offs (if any). In December of 2024, U.S. DOE found that homes built to the 2024 *IECC* prescriptive path will have 6.6% lower annual energy costs than homes built to the 2021 *IECC*, on average. See U.S. Department of Energy, *Notification of Determination*, 89 Fed. Reg. 106458 (Dec. 30, 2024). The current Virginia Construction Code already requires that the proposed home in Section R405 not exceed 95% of the annual energy costs of the standard reference design home. A 6.6% reduction in energy costs is roughly 89%, and that number is proposed above as a single multiplier. We note, however, that if efficiency trade-offs are allowed for heating, cooling, water heating equipment, or for duct location, there would need to be additional changes to the multiplier, and the result would likely be lower than the 80/85% in the published 2024 *IECC*. However, for purposes of this proposal, assuming the equipment trade-offs and duct location credit are deleted, we view 89% as a reasonable starting place that would maintain consistency across compliance paths.

Cost Impact: The code change proposal will increase the cost

This proposal improves the overall efficiency of the performance path by roughly 6.6%, which may increase costs depending on decisions made by code users. However, these changes, taken as a single package, would maintain consistency with improvements made in the prescriptive path.

REC-R408.2.9-24

IRC: N1108.2.9 (R408.2.9)

Proponents: Eric Lacey, representing Responsible Energy Codes Alliance (eric@reca-codes.com)

2024 International Residential Code

Delete without substitution:

~~**N1108.2.9 (R408.2.9) Opaque walls.** For buildings in Climate Zones 4 and 5, the maximum *U*-factor of 0.060 shall be permitted to be used for wood-framed walls for compliance with Table N1102.1.2 where complying with one or more of the following:~~

- ~~1. Primary space heating is provided by a *heat pump* that meets one of the efficiencies in Section N1108.2.2.~~
- ~~2. All installed *water heaters* are *heat pumps* that meet one of the efficiencies in Section N1108.2.3.~~
- ~~3. In addition to the number of credits required by Section N1108.2, three additional credits are achieved.~~
- ~~4. *Renewable energy resources* are installed to meet the requirements of Section N1108.2.7.~~

Reason Statement:

New Section R408.2.9 is an efficiency loophole incorporated into the 2024 *IECC* with potential long-term negative impacts. It allows a reduction in wall insulation where one of four conditions is met. There are several problems with this section:

1. None of the specific measures will provide efficiency for as long as the wall insulation being traded off. Measures 1 and 2 have significantly shorter useful lifetimes than wall insulation; measure 4 creates an efficiency trade-off for renewable energy, which is not allowed in either the prescriptive or performance paths of the *IECC*; and measure 3 allows a code user to select 3 more credits from Table R408.2, effectively creating a prescriptive envelope trade-off for 40+ measures that may or may not match the longevity or efficiency of wall insulation. No analysis was provided to justify this trade-off or to quantify whether these measures could save a comparable amount of energy as well-insulated walls.

2. Some advocates have been urging states to allow double-counting of these measures, effectively reducing envelope efficiency without any improvements elsewhere in the building. The charging language does not clarify whether measures 1, 2, and 4 are *in addition to* measures already used to comply with Section R408.2, or whether a code user may simply double-count these measures and reduce envelope efficiency. Neither the proponent's reason statement for this measure (REPI-33-21) nor any of the debate in the 2024 *IECC* development cycle addressed the possibility of double-counting, and it would seem to contradict language in measure 3 (which requires 3 credits "in addition to the number of credits required by Section R408.2"). Yet advocates at the state and national level have argued that code users should receive credit for these measures both to comply with Section R408.2 and to receive the benefits of an insulation reduction under R408.2.9.

This entire section is problematic, and will only lead to reduced efficiency. The only reason it is included in the 2024 *IECC* is because it was part of a deal among *IECC* Residential Consensus Committee members where sustainability measures and efficiency rollbacks that failed to achieve the required number of votes were grouped into a large "omnibus" package. In response to several appeals, the ICC Board of Directors later reversed the portions of the omnibus related to sustainability, but left in place the efficiency rollbacks, making the 2024 *IECC* less stringent than the 2021 *IECC* in several places. Other states considering the 2024 *IECC* have either deleted this controversial section or are in the process of debating it. We strongly recommend deleting the entire section and maintaining the stringency of the *IECC*.

Cost Impact: The code change proposal will not increase or decrease the cost

This section is a problematic and confusing exception that was introduced in the 2024 *IECC*. Eliminating it does not change the base efficiency requirements of the code, so it will neither increase nor decrease costs for code users.

EC-C402.5.2-24

IECC: C402.5.2

Proponents: DeAnthony Pierce, City of Roanoke, representing Virginia Building & Code Officials Association
(deanthony.pierce@roanokeva.gov)

2024 International Energy Conservation Code [CE Project]

Revise as follows:

C402.5.2 Minimum skylight fenestration area. Skylights shall be provided in *enclosed spaces* greater than 2,500 square feet (232 m²) in floor area, directly under a roof with not less than 75 percent of the ceiling area with a ceiling height greater than 15 feet (4572 mm), and used as an office, lobby, atrium, concourse, corridor, storage space, gymnasium/exercise center, convention center, automotive service area, space where manufacturing occurs, nonrefrigerated warehouse, retail store, distribution/sorting area, transportation depot or workshop. The total *toplit daylight zone* shall be not less than half the floor area and shall comply with one of the following:

1. A minimum skylight area to toplit *daylight zone* of not less than 3 percent where all skylights have a VT of not less than 0.40, or VT_{annual} of not less than 0.26, as determined in accordance with Section C303.1.3.
2. A minimum skylight effective aperture, determined in accordance with Equation 4-3, of:
 - 2.1. Not less than 1 percent using a skylight's VT rating; or
 - 2.2. Not less than 0.66 percent using a Tubular Daylight Device's VT_{annual} rating.

Skylight Effective Aperture =

$$\frac{0.85 \times \text{Skylight Area} \times \text{Skylight VT} \times \text{WF}}{\text{Toplit Zone}}$$

Equation 4-3

where:

Skylight area = Total fenestration area of skylights.

Skylight VT = Area-weighted average visible transmittance of skylights.

WF = Area-weighted average well factor, where well factor is 0.9 if light well depth is less than 2 feet (610 mm), or 0.7 if light well depth is 2 feet (610 mm) or greater, or 1.0 for Tubular Daylighting Devices with VT_{annual} ratings.

Light well depth = Measure vertically from the underside of the lowest point of the skylight glazing to the ceiling plane under the skylight.

Exceptions: Skylights above *daylight zones* of *enclosed spaces* are not required in:

1. Buildings in *Climate Zones* 6 through 8.
2. Spaces where the designed *general lighting* power densities are less than 0.5 W/ft² (5.4 W/m²).
3. Areas where it is documented that existing structures or natural objects block direct beam sunlight on not less than half of the roof over the enclosed area for more than 1,500 daytime hours per year between 8 a.m. and 4 p.m.
4. Spaces where the *daylight zone* under rooftop monitors is greater than 50 percent of the *enclosed space* floor area.
5. Spaces where the total area minus the area of *sidelit daylight zones* is less than 2,500 square feet (232 m²), and where the lighting is controlled in accordance with Section C405.2.3.
6. Spaces designed as storm shelters complying with ICC 500.
7. Data centers, or any room or space where the primary function is to house server cabinets.

Reason Statement: This proposal is meant to address the intent of the Energy Conservation Code, by acknowledging the addition of skylights in data halls, as increasing the cooling requirements of those spaces, which are normally designed to stay cool, and typically do not have people within those spaces. This proposal also acknowledges longstanding industry construction of datacenters, and would reduce any confusion regarding skylight requirements.

Cost Impact: The code change proposal will decrease the cost

The code change proposal will decrease the cost of construction and cooling, since it will not require data centers to be re-designed with skylights included.

These building are typically engineered and designed with air-handlers covering the majority of the roof to cool data hall spaces, or rooms that house servers. Skylights will add additional cooling cost to these spaces, as they are primarily designed to remove heat generated by the server and computer equipment, which is counter to Energy Conservation.